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SANTA ROSA ISLAND

FEDERAL INTERAGENCY

RIPARIAN ASSESSMENT AND RECOMMENDATIONS FOR ACHIEVING WATER QUALITY MANAGEMENT GOALS

CHANNEL ISLAND NATIONAL PARK

— DRAFT —

Technical Report NPS/NRWRD/NRTR-95**

by

Gary Rosenlieb, Bill Jackson, Cece Sellgren, Jim Wolf, Joel Wagner, Jeff Reiner, and Kathryn McEachern

June 1995

United States Department of the Interior
National Park Service
Washington, D.C.

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TABLE OF CONTENTS

Page No.

Executive Summary v
Introduction 1
  Issue and Background 1
  Purpose and Objectives 1

Physical, Biological Environs and Current Grazing Management .. 2
  Physical Setting 2
  Vegetation 2
  Water Quality 5
  Grazing Management 5

Approach and Methods 7
  Riparian Condition and Water Quality 7
  Process for Accessing Proper Functioning Condition 8
  Field Methods 8

Results 9
  Geomorphic Status 9
  Individual Stream Riparian Assessments 16
    Windmill Canyon 16
    Canada Lobos 17
    Arlington Canyon 20
    Acapulco Canyon 21
    Quemada and Old Ranch Canyons 22
    Jolla Vieja 22

Opportunities to Improve Riparian Area Function Through Livestock Grazing Management 23
  General Concepts 23
    Stream Corridor Fencing 23
    Specialized Grazing Strategies 24
    Riparian Pasturing 24
  Specific Opportunities on Santa Rosa Island 25
    Exclusion by Stream Corridor Fencing or Pasture Closures 26
    Targeted Seasonal Grazing 26
    Island-Wide Rotational Grazing Strategy 28

Summary and Conclusions 30

Literature Cited 32

Appendices 34
  A. Cleanup or Abatement Order for Santa Rosa Island 35
  B. Field Sheets 44

LIST OF FIGURES

Page No.

Figure 1. Regional Location Map..... 3

Figure 2. Santa Rosa Island..... 4

Figure 3. Riparian Assessment Reaches..... 10

Figure 4. Incised Colluvium in Quemada Canyon..... 11

Figure 5. Incised Bedrock in Quemada Canyon..... 12

Figure 6. Arlington Canyon Terraces..... 13

Figure 7. Evolution of an arroyo..... 15

Figure 8. Windmill Canyon Reach #1..... 17

Figure 9. Canada Lobos Reach #2..... 18

Figure 10. Canada Lobos Reach #3..... 19

Figure 11. Typical Reach in Arlington Canyon..... 20

Figure 12. Old Ranch Canyon..... 21

Figure 14. Jolla Vieja Canyon..... 23

EXECUTIVE SUMMARY

This report presents the results and recommendations of an interdisciplinary team consisting of National Park Service (NPS), U.S. Bureau of Land Management (BLM), U.S. Forest Service (USFS) and National Biological Service resource management and watershed specialists that conducted an assessment of the functionality of selected riparian areas on Santa Rosa Island using the BLM's Process for Assessing Proper Functioning Condition (USDI 1993). The assessment was conducted to assist Channel Islands National Park in preparing a plan to comply with a State of California Central Coast Water Quality Control Board Cleanup or Abatement Order alleging that the NPS, by permitting improper road and grazing management practices on Santa Rosa Island, is discharging unlawful concentrations of bacteria and sediments into waters of the state. The order specifically identifies damage to riparian vegetation by free-grazing cattle, and the subsequent erosion and degradation of habitat, as a major cause of the water quality violations.

Two overriding premises in this analysis are: (1) riparian area condition influences water quality in watersheds grazed by domestic livestock; and (2) many riparian areas can be restored to a **properly functioning condition**, through changes in grazing management. The functioning condition of a riparian area refers to the physical habitat processes associated with the interaction of geology, soil, water and vegetation, and it is based upon the concept that in order to manage for such things as vegetation status, it is first necessary to have the basic elements of physical habitat in place and functioning properly. Thus, properly functioning condition is a minimum condition required to manage for more advanced objectives such as the composition and seral stage of riparian vegetation.

The interdisciplinary team assessed and rated functionality on ten reaches representing seven-second-order streams on Santa Rosa Island. Only two reaches near and in an ungrazed exclosure of Cañada Lobos were found to be in Properly Functioning Condition. One reach each in Windmill Canyon and Acapulco Canyon were judged to be in Functioning Condition but at some degree of risk. Six reaches, including three in Arlington Canyon, one in Jolla Vieja, and one each in Quemada and Old Ranch Canyon, were all judged to be Nonfunctional. The attribute that nonfunctioning riparian areas on Santa Rosa Island have in common is the lack of sufficient herbaceous and/or woody vegetation that would serve to retain bank soils and retard lateral migration of the channel during each flood event. The lack of riparian species is most likely the result of the existing grazing management scheme of year-long continuous grazing in most of the pastures.

Based on the results of the assessment, and the team's experience with other Western U.S riparian areas, the team concludes that Santa Rosa Island riparian areas have a very good chance of responding to changes in grazing management that allow for multi-

year, or at least seasonal, rest of the riparian areas. Three alternative grazing concepts and options, suitable to form the basis for a planned island-wide environmental statement, that incorporate these tenets are presented and analyzed in this report. The alternatives discussed include exclusion of grazing by stream corridor fencing or pasture closure, targeted seasonal grazing, and island-wide rotational grazing. The alternatives and options presented do not represent the universe of viable grazing management strategies. Other variations that incorporate riparian-area rest are possible. For any of these grazing concepts to be implemented, a detailed grazing plan would have to be developed. Developing such a plan would necessarily involve close coordination between the park and Vail and Vickers Ranch.

Short of total elimination of grazing, exclusion of grazing in selected areas by riparian corridor fencing or closing existing pastures would allow for the most direct and rapid recovery of riparian function. Riparian corridors, or excluded pastures, could be managed for total exclusion or for direct and intensive management of forage utilization. The primary drawbacks to riparian corridor fencing are initial fence construction costs and the need for intensive management by the permittee should it be desired to graze riparian corridors. Initial capital costs for fencing could be eliminated by closing existing pastures, however allowable stocking rates would most likely have to be cut for other portions of the island.

Island-wide rotational grazing offers the best opportunity for comprehensively managing all of the island's riparian systems and their associated upland watersheds on a long-term basis. The primary drawbacks are high levels of initial capital costs required for fencing and water development and the need for sustained intensive management by the permittee. The time required for recovery of riparian function may be slower than for systems involving intensive riparian management or exclosures. Also, it may be more difficult to control riparian forage utilization than in systems which more directly target riparian pastures.

Targeted seasonal grazing offers the best opportunity to enhance riparian function in selected reaches, with minimum up-front investment and minimum long-term impact on current grazing management. This would be particularly true if initial efforts were focused on potentially responsive riparian systems in the Island's smaller pastures. The primary drawbacks are the lack of management on the majority of the streams on the island and the slower recovery time compared to systems involving intensive riparian management or exclosure.

Implementation of any of the alternative grazing management concepts should be preceded by careful development of measurable riparian condition objectives. This should be done in close coordination with the permittee. The effectiveness with which management is achieving objectives needs to be intensively monitored, and there needs to be a commitment up-front on the part

of the NPS and permittee to make any necessary adjustments in management based upon mutual reviews of monitoring information.

SANTA ROSA ISLAND RIPARIAN ASSESSMENT AND RECOMMENDATIONS FOR ACHIEVING WATER QUALITY MANAGEMENT GOALS

INTRODUCTION

Issue and Background

On May 17, 1995 the California Central Coast Regional Water Quality Board (CCCRWQB), through a Cleanup or Abatement Order, directed Channel Islands National Park (CHIS) to correct grazing and transportation-related water quality problems on Santa Rosa Island (SRI). Specifically, the Order alleges that CHIS, by permitting improper transportation and riparian grazing management practices, is discharging unlawful concentrations of bacteria and sediment into waters of the State in violation of the Regional Water Quality Control Plan for the Central Coast Basin. The Order requires the National Park Service to develop and submit to the Regional Board Executive Officer by July 1, 1995, a plan that describes the measures that will be employed by the NPS to abate pollution from rangeland and road management practices. The NPS must also submit to a rigorous required monitoring and reporting regimen on the quality of waters and rangeland on the Island. The complete text of the Order is contained in Appendix A.

Purpose and Objectives

To comply with the State's order, CHIS required a rapid evaluation of riparian-area condition on Santa Rosa Island and an assessment of whether modifications in the current grazing management scheme could be used to meet water quality goals. Based on a review of readily available and easily implementable evaluation techniques, the NPS adopted the Bureau of Land Management's Process for Assessing Proper Functioning Condition (USDI 1993) to evaluate Santa Rosa Island's riparian areas. An interdisciplinary team completed the field portion of the assessment during the week of March 20, 1995. The purpose of this report is to summarize and interpret findings of that assessment. The specific objectives of this report are to: (1) appropriately classify selected Santa Rosa Island riparian areas as properly functioning, functioning at risk, or non-functioning; (2) determine if non-functional systems are degraded beyond their capability to respond to management; (3) identify alternative grazing strategies that will improve overall riparian conditions, achieve an acceptable level of riparian functionality and decrease or eliminate the frequency of water quality standard violations for systems that appear to be capable of responding to management.

PHYSICAL, BIOLOGICAL ENVIRONS and CURRENT GRAZING MANAGEMENT

Physical Setting

Located about 15 miles south of Santa Barbara, CA the 54,000 acre Santa Rosa Island is one of five islands that comprise Channel Islands National Park (Figure 1). With the 1574 foot Soledad peak at its hub, a highly-dissected, radial drainage network has evolved on the island. There are 18 second order intermittent and perennial drainages on the Island, including Windmill Canyon, Cherry Canyon, Water Canyon, Quemada Canyon (includes Old Ranch Canyon), San Augustine Canyon, Wreck Canyon, Jolla Vieja Canyon, Trancion Canyon, Acapulco Canyon, Whetstone Canyon, Bee Canyon, Cañada Garañon, Tecolote Canyon, Arlington Canyon, Soledad Canyon, Verde Canyon and Cañada Lobo, (Figure 2).

The Island is divided by the Santa Rosa fault. North of the fault, the underlying parent material is primarily tertiary sandstones and shales, as is much of the rest of southern California's Transverse Ranges. Underlying rock south of the fault is more volcanic in origin, produced during a Miocene episode of volcanism. The unstable landscapes of the islands are visually evident by numerous soil slips and small landslides throughout the Island, a condition that is generally consistent with the geology and landscape of the California coastal mountain ranges (Swanston 1971).

Vegetation

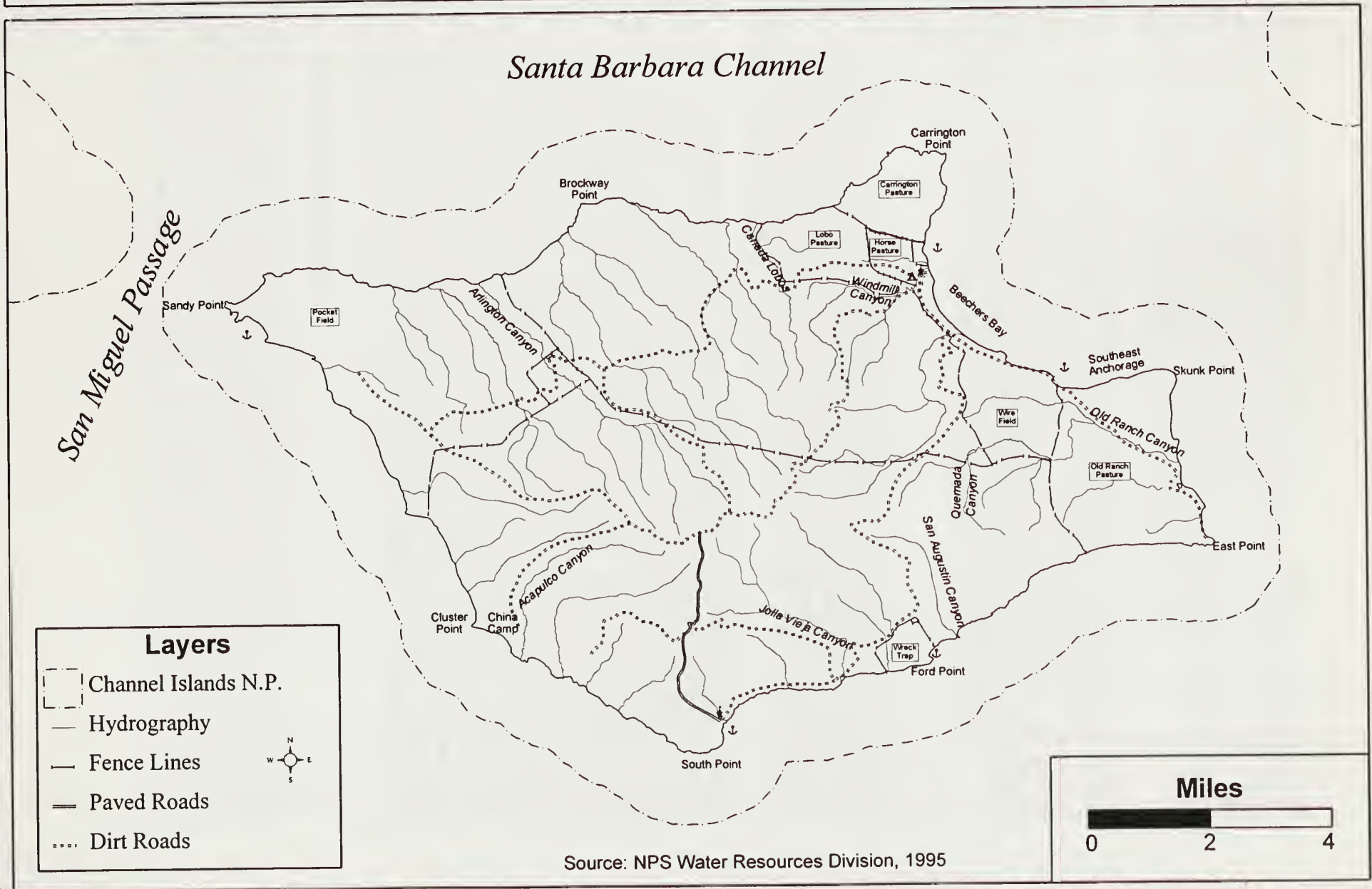
Vegetation on Santa Rosa Island is dominated by grasslands, with approximately 2/3 of the island being covered by grassland species. (Clark *et al*, 1990). In most places introduced annual grasses and forbs comprise the majority of the grasslands. However, there are several areas that still have significant amounts of perennial grasses. Common grass species include: *Avena barbata, A. fatua, Bromus diandrus, B. mollis, B. rubens, Distichlis spicata* ssp. *stolonifera, Hordeum californicum, H. murinum ssp. leporinum, Stipa pulchra, Vulpia dertonensis.* Common forb species include: *Erodium cicutarium, Hypochoeris glabra, Medicago polymorpha, Silene gallica, Amsinkia intermedia, and Sonchus oleraceous.*

Approximately 25% of the island is covered by scrub communities, with coastal sage scrub and mixed chaparral being the most common (Clark *et al*, 1990). The coastal sage scrub is dominated by California sagebrush (*Artemesia californica*) and coyote bush (*Baccharis pilularis* ssp. *consanguinea*), while the chaparral is dominated by chamise (*Adenostoma facisculatum* v. *faciculatum*). Both communities support a diverse herbaceous understory that are extensively grazed as well.

Less than one percent of the island is covered by woodlands (Clark et al, 1990). Santa Rosa Island supports one of two populations of

Figure 1. Channel Islands National Park Regional Location Map

Figure 2. Channel Islands National Park
Santa Rosa Island



torrey pines (*Pinus torreyana*) in the world. The island also has a few small groves of Santa Cruz Island Pines (*Pinus remorata*), island oaks (*Quercus tomentella*), and Santa Cruz Island Ironwood (*Lyonothamnus floribundus* ssp. *aspenifolius*). The scrub and woodland communities have been heavily impacted by introduced deer. Pincushioned shrubs, highlined trees, and woodlands with little herbaceous understory are common on the island.

There are sixteen streams which contain segments of perennial flow. Shrubs or trees are absent in most riparian areas with many stretches devoid of any vegetation. In many cases riparian vegetation is dominated by introduced annual grasses such as water bent (*Agrostis semiverticillata*) and rabbit's foot grass (*Polypogon monspeliensis*). Saltgrass (*Distichlis spicata* ssp. *stolonifera*) is also a common component of riparian herbaceous communities.

Water Quality

The most complete and descriptive presentation of current water quality conditions on the Island is found in "Inventory of Water Quality on Santa Rosa Island, Channel Islands National Park" by Sellgren (1995) which presents the results of a monitoring program conducted between October 1993 and December 1994 on Lobo Canyon, Water Canyon, and Quemada Canyon.

A total of 26 observations were collected for discharge, water temperature, pH, conductivity, salinity, dissolved oxygen, turbidity, nutrients, dissolved solids, suspended sediments, and total and fecal coliform. Generally, sites in Cañada Lobos exhibited better water quality characteristics than sites monitored in the other two streams. Mean values for temperatures, conductivity, turbidity, and log mean values for fecal coliform were all lower at Lobos Canyon sites than in sites monitored in Quemada Canyon and Water Canyon. The disparity in fecal coliform concentrations are particularly noteworthy. Based on a 19-sample population, the log-mean fecal coliform concentrations were 169, 1501, and 1249 MPN/100ml for Lobos Canyon, Water Canyon and Quemada Canyon, respectively. The fecal coliform body-contact recreation standard in most states is established as not to exceed a log mean of 200 fecal coliforms/100ml based on five samples collected in a 30 day period.

Current Grazing Management

The island was purchased from the Vail and Vickers Co. in 1986 fulfilling, in part, enabling legislation that also allowed the former landowner to continue operating a traditional stocker-cattle ranching and commercial hunting operation for 25 years from the date of purchase as long as it is operated in a manner that is compatible with "the administration of the park or the preservation of the resources therein" (PL 96-199 Title II Sec 202 (d) (1)).

Since 1987 the NPS has administered the Vail and Vickers' grazing and commercial hunting activities through Special Use Permits (SUP) that are renegotiated every five years.

Under the Vail and Vickers stocker operation, calves are brought to the island, usually in the fall, and fattened on the island for approximately 18 months, then taken off the island to a feed lot (Bartolome and Clawson, 1992). For the most part the ranch uses a year-long continuous grazing system, where cattle spend an entire year (or more) in one pasture. There is apparently little pasture rotation of the cattle.

The island is divided into ten pastures. Five of the pastures (comprising approximately 50,000 acres) are used to graze cattle with the year-long continuous grazing system. The other five pastures are holding pastures. Because the pastures are so large (up to 24,000 acres) and water sources so limited, the island experiences very patchy use by the cattle. In these types of situations, forage resources are underutilized in upland areas, while in areas near streams, the forage is more intensively utilized (Valentine, 1990). This leads to extensive use of and damage to the riparian areas (Stoddart, *et al*, 1990).

During negotiations for the 1992 SUP the NPS added a stipulation stating that "A range management plan (RMP) will be developed by the Permittee and the NPS for the purposes of continuing the enhancement of the rangelands and to accommodate the grazing stock and revegetation of the grasslands". The RMP was subsequently developed by Dr. James Bartolome and Mr. James Clawson. While the RMP established stocking rates for the ten existing pastures on the island, it did not discuss management alternatives such as removal of livestock, changes in season of use or changes in numbers and sizes of pastures due to the "agreement with the permittee at the time of purchase to allow continued ranching and hunting for 25 years from the date of purchase and because insufficient data is available to begin effective restoration of native ecosystems" (Environmental Assessment and Range Management Plan, 1992).

The RMP did, however, recognize that the condition of the SRI riparian areas was an issue of concern by noting that "The impacts of livestock on streams is of general environmental concern, as shown by the recent draft policy on mitigation of water quality impacts in the coastal zone...." by the Environmental Protection Agency, and further noted that the definition of acceptable livestock impacts on water will likely be considerably changed through legislation. They also prescribed the construction of a protective riparian fence for Cañada Lobos, which was completed in 1993, and establishment of a riparian monitoring program for the rest of SRI which is scheduled to commence in the fall of 1995.

APPROACH AND METHODS

Riparian Condition and Water Quality

The overriding premises in this analysis are: (1) riparian area condition influences water quality in watersheds grazed by domestic livestock; and (2) many riparian areas can be restored to a **properly functioning condition** through changes in grazing management. The approach used to assess riparian area conditions involved evaluating current riparian function as a basis for developing management goals and objectives. Given a clear set of management goals and objectives, it then is possible to develop livestock grazing prescriptions to achieve those objectives.

The poor condition of Santa Rosa Island's riparian areas caused by historic and current grazing practices is the focal point of the State's Cleanup and Abatement Order, and it strongly implies that water quality management goals established by the Central Coast Water Quality Management Plan and measured by fecal coliform and sediment concentrations could be met if improved riparian conditions could be obtained. In fact, the ability of riparian and wetland systems to effectively remove or reduce the concentrations of a wide variety of water pollutants (particularly nutrients) has been well documented in the scientific literature over the last decade (Baughman et al. 1989; Sunblad and Wittgren 1989). Processes acting synergistically in wetlands such as biological decomposition, photochemical reactions, sedimentation, filtration, and plant absorption and assimilation in wetlands are known to substantially reduce nitrogen and phosphorus, as well as suspended solids, bacteria, organic matter, and other pollutants (Hammer 1989).

The ability of wetland and riparian systems to specifically reduce fecal coliform concentrations is documented by Miller (1989) who found that a constructed cattail marsh lowered fecal coliform in 32 of 33 trials, and in some cases was able to produce effluent that meets swimming and bathing standards. Scheuerman et al. (1986) found that fecal-bacterial indicators (fecal coliform, fecal streptococci) were reduced by 3 orders of magnitude after flowing through 230 meters of a Florida cypress strand. Johnston et al. (1990) found a significant relationship between fecal coliform reduction and proximity of wetlands to a stream near Minneapolis, MN. And, in their study of the impact of riparian and wetland vegetation on non-point source pollution from pasturelands and croplands, Brenner et al. (1991) found that riparian and wetland plant communities were effective in reducing total phosphorus, suspended solids, and fecal coliform from a stream in northwestern Pennsylvania (wetlands were also effective in reducing ammonia). These authors concluded that the establishment and maintenance of wetlands and riparian vegetation are cost-effective means of nonpoint source pollution abatement.

Process for Assessing Proper Functioning Condition

The process for assessing proper functioning condition is described in USDI-BLM Technical Reference TR 1737-9 Riparian Area Management - Process for Assessing Proper Functioning Condition (USDI-BLM, 1993). The BLM process is keyed to an interdisciplinary team assessment of riparian area functionality. The functioning condition of a riparian area refers to the physical habitat processes associated with the interaction of geology, soil, water and vegetation. Functioning condition does not refer to the ecological status of riparian flora or fauna dependent upon riparian habitats. Rather, it is based upon the concept that in order to manage for such things as vegetation status, it is first necessary to have the basic elements of physical habitat in place and functioning properly. Thus, properly functioning condition is a minimum condition required to manage for more advanced objectives such as the composition and seral stage of riparian vegetation.

In the BLM process, riparian areas are categorized as:

> **Proper Functioning Condition -** Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity.
>
> **Functional - At Risk -** Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.
>
> **Nonfunctional -** Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc., as listed above. The absence of certain physical attributes such as a floodplain where one should be are indicators of nonfunctioning conditions.

Field Methods

To evaluate functionality, an interdisciplinary team consisting of a hydrologist/geomorphologist, botanist, riparian vegetation specialist, water quality specialist, wetland scientist, aquatic biologist, geologist and two range management specialists was assembled. A specialist from BLM who is experienced in the application of the USDI Bureau of Land Management (1993) method

provided leadership to the team.

Ten segments on seven streams, including two segments representative of pseudo-relic conditions, were selected to represent the range of physiographic zones and stream types on Santa Rosa Island (Figure 3). The team (or one of two split-teams) walked each of the subject stream segments and rated the various processes/attributes which contribute to riparian function. Those processes/attributes are grouped under the categories of hydrogeomorphic attributes, vegetation attributes, and erosion/deposition attributes. After ranking riparian areas as functional, functional-at risk, or non-functional the team then developed a subjective assessment of the riparian area's capability, potential and likely responsiveness to management. Use of relic areas in enclosures, examination of existing vegetation and soils, information on native vegetation and historic conditions, experience of the team in working in other similar riparian systems, and many other sources of information were used to assess capability and potential. It became apparent after the synthesis and integration of the information by the team that geomorphologic processes as well as historic land uses have played an important role in shaping the present-day landscapes of Santa Rosa Island. Therefor, a discussion of the geomorphic status and its inferences to overall riparian conditions on the island is included in the Results section.

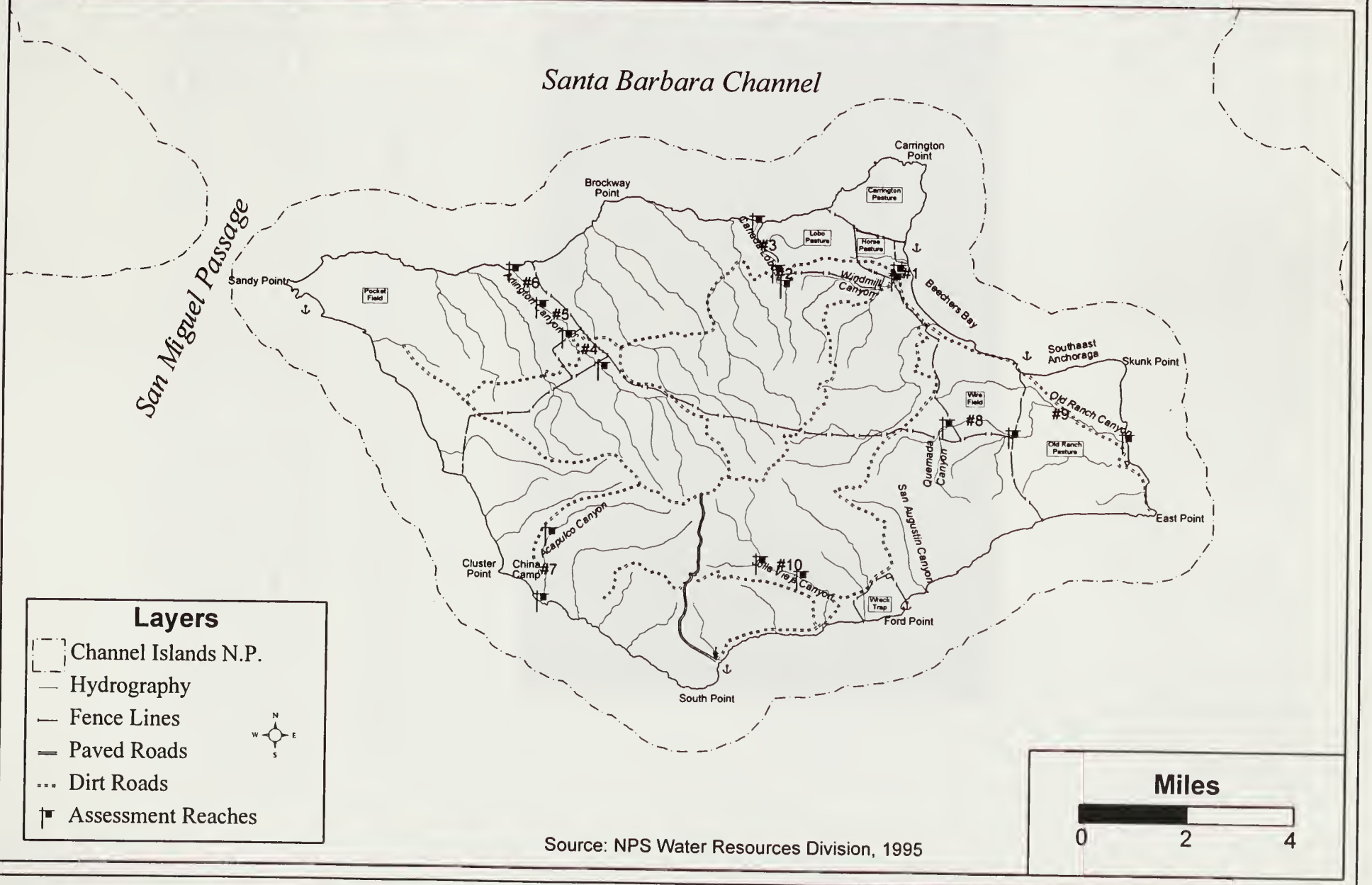
RESULTS

Geomorphic Status

Most drainages on Santa Rosa Island are deeply incised, and take on the character of large arroyo systems common in the southwest United States. The depth of incision varies, but approaches 30 ft. in many areas. The depth of incision is less on first-order channels and near the mouths of some main channels such as Old Ranch Creek. In some reaches, vertical cuts appear to exceed 30 ft. (Figure 4), but this usually occurs in areas where the arroyo has cut laterally into colluvial deposits. There is abundant evidence that an arroyo system was imprinted on the island in pre-historic times. For example, on Quemada Creek there are reaches where the stream has cut through 6-8 ft. of resistant sandstone bedrock overlain by approximately 15 ft. of alluvial material (Figure 5). The stream would had to have cut through the alluvium to bedrock a long time ago in order for this much downcutting in bedrock to have occurred.

In the case of the arroyo system on Santa Rosa Island, there is evidence that arroyo downcutting occurred in at least two, and possibly more, major downcutting episodes. Most of the arroyo

Figure 3. Riparian Assessment Reaches
Channel Islands National Park
Santa Rosa Island



Source: NPS Water Resources Division, 1995

systems we visited had remnant terraces roughly half-way down the main arroyo walls (Figure 6). Episodic downcutting is not uncommon for arroyo systems and often occurs when gradual geomorphic processes (such as sedimentation or tectonic uplift) result in a net steepening of the overall slope of a river system (Schumm, 1977; Bull, 1979; Harvey, et.al., 1985). Erosion "thresholds" eventually are created and rapid downcutting can then be triggered by large runoff events, or by a combination of large discharges and impacted watershed, channel or riparian conditions.

Figure 4. Incised colluvium in a reach of Quemada Canyon

On Santa Rosa Island we hypothesize that combinations of valley sedimentation, tectonic uplift and/or changes in sea level resulted in the establishment of erosion thresholds, and that exceedance of these thresholds has resulted in two or more past episodes of rapid channel incision. It is possible that the most recent episode of downcutting corresponded to the period during which the island was grazed by domestic sheep and cattle, and that poor watershed and

riparian conditions (combined with large runoff events) contributed to the exceedance of natural erosion thresholds. Considerably more study would be required to more precisely and completely date and decipher the history of arroyo development on Santa Rosa Island.

Once arroyo systems have downcut into the landscape, they typically undergo additional stages of evolution (Van Haveren and Jackson, 1986; Harvey, et.al., 1985; USDI Bureau of Land Management, 1993).

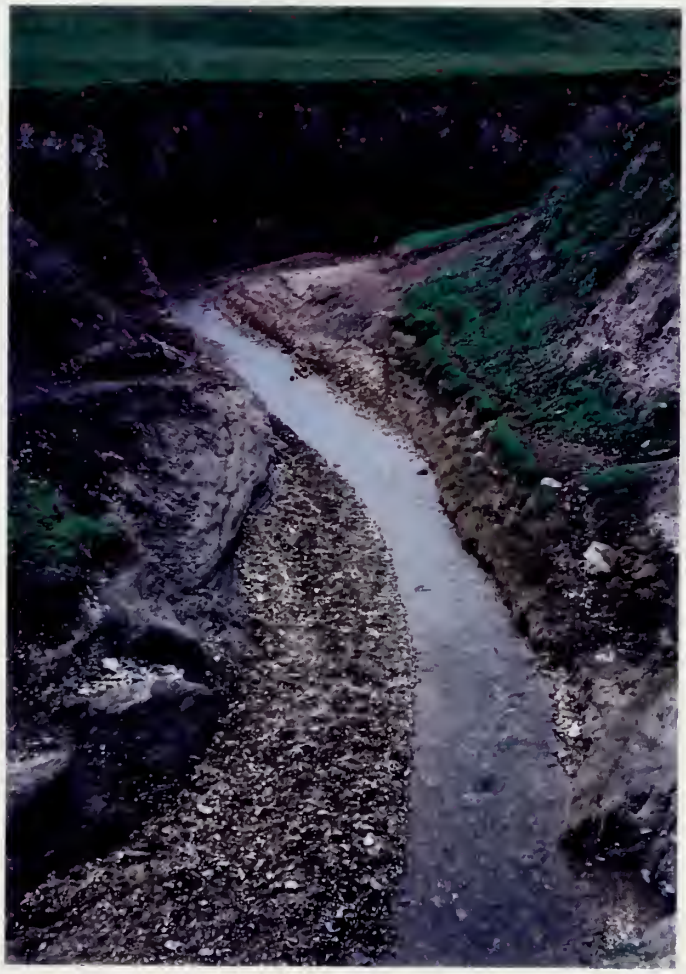


Figure 5. Incised Bedrock in Quemada Canyon

Arroyo evolution following initial downcutting involves lateral erosion of the main arroyo walls and consequent widening of the arroyo floor (Figure 7, Profiles A-C). A secondary "inner" channel usually forms in the floor of the widened arroyo. As the arroyo matures, the inner channel becomes sized to carry common flows

Figure 6. A Reach of Arlington Canyon with Terraces Evident on the left and right.

(flows less than the mean annual peak flow), and the arroyo floor begins to function as a floodplain. Widening of the arroyo floor generally ceases when the inner channel floodplain has adequate width to convey large floods (Figure 7, Profiles D-E). Aggradation of the inner channel and arroyo floor may or may not occur once the arroyo has evolved an effectively functioning floodplain.

Although some small first-order drainages still are actively headcutting, we do not think that the major arroyos on Santa Rosa

Island are actively downcutting at the present time. Almost all the major arroyos we visited have their base levels controlled by bedrock. Even though we visited these streams shortly after they experienced extremely large discharges, there was very little evidence of additional downcutting. More commonly, these arroyos responded to the recent high flows by enlarging main-flow "inner" channels within the arroyo floor.

Inner-channel enlargement during the 1995 high flows occurred by widening (through erosion) into floodplain deposits on the arroyo floor and, in some cases, by cutting laterally into the main arroyo walls. While localized widening of the main arroyo walls was observed, in general the arroyo system on Santa Rosa Island either is confined laterally by resistant geologic strata, or has undergone sufficient evolution and widening to where functional floodplains can be established. Effective floodplain development and proper hydrologic and geomorphic function are being retarded by the absence (or poor status) of herbaceous and woody riparian vegetation on the arroyo floors.

There is little question that the amount of erosion associated with channel and arroyo widening during the large winter storms of 1995 was influenced by grazing in the riparian zone and the consequent lack of riparian vegetation on inner-channel banks and on the arroyo floor. Had riparian vegetation conditions been adequate to permit proper riparian area function, main channel flows would have spilled out of the inner-channels onto the arroyo floor without enlarging them. Thus the arroyo floor should have functioned more effectively as a floodplain, both by dissipating the erosive energy of flows and by inducing floodplain sediment deposition. Even under a properly functioning condition, some erosion of main arroyo walls could be expected to occur in selected spots, where flows came in direct contact with bare arroyo walls.

Finally, the geomorphic character of the streams and riparian areas of Santa Rosa Island likely is influenced by upland watershed conditions. Livestock (and past sheep) grazing has reduced vegetation cover which in turn leads to increases in surface runoff and erosion during rainfall. Increased sedimentation rates have, in fact, been correlated to the beginning of sheep grazing on the island by Cole (1993) who found that postsettlement (1874-1920) average sediment delivery rates to Abalone Rocks Marsh in Old Ranchhouse Canyon were thirty times higher than those of the 5000 year presettlement and herbivore grazing period. Sedimentation rates currently remain nine times higher than pre-historic levels.

Some of this erosion results in large rills and expansions of first-order drainages which concentrate flows and effectively increase drainage network densities. This results in more rapid conveyance of rainfall runoff to streams. Additionally, poorly maintained dirt roads are erosion sources and serve to more rapidly

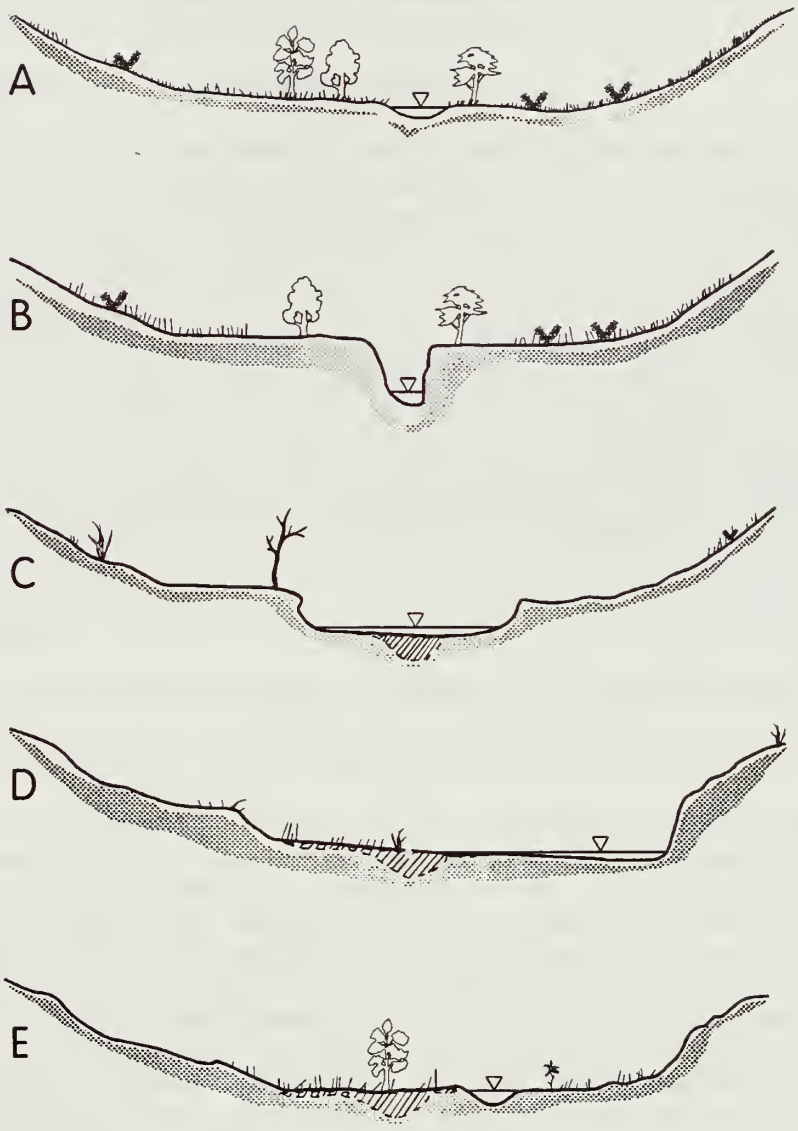


Figure 7. Evolution of an arroyo.

convey runoff to streams. The primary influence of poor upland watershed conditions on the riparian areas of Santa Rosa Island probably is increased storm peak flows in streams and increased channel erosion caused by those increased peak flows. While upland erosion impacts upland soil and vegetation resources and water quality by contributing to increased sediment loads. However, there is little evidence that accelerated upland erosion (in contrast to arroyo erosion) is impacting riparian resources.

INDIVIDUAL STREAM RIPARIAN ASSESSMENTS

Ten reaches representing seven-second-order streams on the Island were assessed by the team and rated for their functionality. Only two reaches near and in the ungrazed exclosure of Cañada Lobos were found to be in Properly Functioning Condition. One reach each in Windmill Canyon and Acalpulco Canyon were judged to be in Functioning Condition but at some degree of risk. Six reaches, including three in Arlington Canyon, one in Jolla Vieja, and one each in Quemada and Old Ranch Canyon, were judged to be Nonfunctional. Summaries of each stream-reach evaluation, consisting of the Reach and Stream ID, Functionality Rating, summary assessment, and photo are presented in this section. Facsimiles of the completed process/attribute list and score sheet used in this evaluation is reproduced in Appendix B.

Windmill Canyon

Reach ID: #1 Upper horse Pasture Fence to Smith Highway Cutoff

Functionality Rating: Functional - at Risk (High)

Assessment: The Windmill Canyon reach inside the Horse Pasture was selected as one of the two relic areas on the Island to be used to evaluate potential riparian capability on the Island. The horse pasture, while grazed by horses, has not been grazed by cattle for some time and a visually apparent fenceline contrast exists at the upstream portion of the pasture. The functional - at risk rating was assigned to this reach because there was some presence of woody bank vegetation, primarily arroyo willow which served to dissipate stream energies, retain existing stream bank integrity and trap significant quantities of cobble to boulder-sized bedload and smaller silt-sized washload sediments (Figure 8) during a relatively low-recurrence interval flood event (possibly of 50 to 100 year magnitude).

Attributes of the reach which place it at high risk include an out of balance width-depth ratio, lack of herbaceous bank vegetation which would serve to further protect banks during overbank flooding events, exposed point bars, and excessive bed and washload sediment deposition from upstream upland and channel sources. The Windmill Canyon reach above the Horse Pasture would be rated as non-

functional because it lacks energy dissipating woody bank vegetation, and generally lacks the floodplain and erosional characteristics that are required for proper functionality.

Figure 8. Windmill Canyon #1. The presence of bank-protecting Willow gives this section of the stream functionality. But excessive bedload sediment deposition places it at high risk.

Cañada Lobos

Cañada Lobos represented the second relic area that was utilized by the team as a baseline reference for potential. A portion of the canyon was fenced in 1993 to exclude cattle, and there is evidence that it was generally inaccessible to livestock due to steep slopes, and natural geologic barriers through the period of historic grazing on the island. Two reaches were evaluated and their summary assessments are below.

Reach ID: Cañada Lobos - #2

Functionality Rating: Properly Functioning Condition

Assessment: This reach of Cañada Lobos is just above the exclosure that was constructed in 1993, however, the steepness of the slopes leading into the canyon discourages livestock grazing. The reach was judged to have the attributes of a properly functioning stream

riparian area, including appropriate floodplain-bank relationship, sufficient herbaceous vegetation to dissipate stream energies and maintain bank stability during flood events, an expanding riparian area and vegetated point bars, channel characteristics that provide suitable aquatic habitats, and an appropriate, although not ideal, balance between sediment inputs into the system (Figure 9). Excessive sediment deposition on the point bars probably is derived from upland soil slips that occurred after the recent heavy rains. Although rated in Properly Functioning Condition, this reach is probably not at its potential relative to desired plant communities.

Figure 9. Cañada Lobos #2. Sediment-trapping herbaceous vegetation on the banks and point bars, and more ideal channel characteristics places this reach in Proper Functioning Condition.

Reach ID: Cañada Lobos #3

Functionality Rating: Proper Functioning Condition

Assessment: A diverse, and mostly vigorous, energy dissipating and bank-protecting herbaceous and woody riparian vegetative community structure consisting of arroyo willow (*Salix lasiolepsis*) black cottonwood (*Populus trichocarpa*) and Mexican elderberry (*Sambucus mexicana*), saltgrass (*Distichlis spicata ssp stolonifera*) and Mexican rush (*Juncus mexicanus*) present in this relic area at the very least epitomizes a proper functioning riparian area on Santa Rosa Island and perhaps is indicative of the potential natural plant community for riparian areas on Santa Rosa Island. Deer browsing is evident, and effecting the vigor of the woody plants. A browseline is evident on the willows, and the trees and shrubs are decadent, and reproduction is judged to be poor. Channel characteristics in this reach are near ideal, with low width depth ratios, overhanging banks have or are being formed, and the stream is both horizontally and vertically stable (Figure 10).

Figure 10. Cañada Lobos 3#. Diverse riparian vegetation, and ideal channel characteristics places this reach at Proper Functioning Condition and beyond.

Arlington Canyon

Reach ID: Arlington #4, #5 and #6 - Arlington Corrals to the ocean

Functionality Rating: Nonfunctional

Assessment: While separate assessments were completed for three reaches on this drainage, all were rated as nonfunctional and only subtle differences exist between the attribute assessment for the reaches. The portion of the drainage assessed is absent almost all of the attributes required for a proper functioning riparian area. An oversupply of sediment from upland and channel sources has exceeded the stream transport capability. The channel is typically braided and lateral instability is high, resulting in high width/depth ratio and unnatural sinuosity. Riparian and wetland vegetation is absent and point bars are bare laying open the banks to erosion during each flood event (Figure 11). The channel is, however, vertically stabilized by numerous bedrock controls throughout its longitudinal profile, and it appears to have high potential for natural restoration, especially in the lower reaches where gradients are low to moderate, and there is the remnant of a functional floodplain.

Figure 11. Typical reach in Arlington Canyon indicating a lack of bank and point bar vegetation, excessive sediment deposition, and poor channel characteristics.

Acapulco Canyon

Reach ID: #7

Functionality Rating: Functional-- At Risk (Limited)

Assessment: This drainage, while judged to have some upward potential for functionality, was evaluated to be in harmony with its geomorphic landform. Generally, sinuosity and the width depth ratios were judged to be near their potential. A lack of woody species and point-bar vegetation places this riparian system slightly at risk.

Quemada and Old Ranch Canyons

Reach ID: #8 and #9

Functionality Rating: Nonfunctional

Assessment: While the few representatives of the vegetative species present indicate that riparian soil moisture is being maintained, it lacks both the herbaceous and woody species that should be represented on the floodplains in this drainage. Old Ranch Canyon (Reach #9) is especially indicative of an area that is presently judged to be nonfunctional (high width-depth ratios, exposed point bars, and poor sinuosity characteristics) but has high restoration potential (Figure 12).

Figure 12. Old Ranch Canyon.

The low to moderate gradients in the Old Ranch reach would naturally enhance sediment deposition, the current high sediment loads provide ample material for bank and floodplain reconstruction, and existing loamy bank soils are an excellent substrate for the natural reestablishment of woody and herbaceous vegetation.

Jolla Vieja

Stream ID: #10

Functionality Rating: Nonfunctional

Assessment: The ratings assigned to the attributes of this reach are very similar to those assigned to Arlington Canyon. There is little floodplain development despite forced lateral migration of the channel by excessive sedimentation from upland and channel sources that exceeds the stream's power to transport it. The arroyo is widening overall, but the floodplain is seldom inundated by floodwaters (Figure 13). The riparian corridor is extremely narrow. Vegetation is largely absent form the point bars and channel area, thus exposing the channel to erosion during each flood event.

Figure 13. Jolla Vieja Canyon.

OPPORTUNITIES TO IMPROVE RIPARIAN AREA FUNCTION THROUGH LIVESTOCK GRAZING MANAGEMENT

General Concepts

Development of grazing management options first requires defining site-specific goals and objectives for the condition of specific riparian areas. While it was beyond the purview of the team to develop management goals and objectives for the park, the team did identify riparian areas that presently were non-functional but which would be responsive to management and had good capability and potential to become properly functioning. The attribute that all nonfunctioning riparian areas on Santa Rosa Island have in common is the lack of sufficient herbaceous and/or woody vegetation that would serve to retain bank soils and retard lateral-channel migration during each flood event. The lack of propagation of desirable riparian species is most likely due to the existing grazing management scheme of continuous year-long grazing in most of the pastures. Because this grazing regimen almost always results in a disapportionate share of the vegetation used from the riparian areas it appears that the continuation of the strategy on Santa Rosa Island will not allow the park to meet the water quality goals of the State of California.

Based on our assessment of relic areas on Santa Rosa Island, and our experience with other western United States riparian areas, we believe that most riparian systems on Santa Rosa Island have a very good chance of responding to changes in grazing management that allow for multi-year, or at least seasonal rest of the riparian areas. Because vegetation often plays a major role in the function of the riparian systems it is important to employ grazing management strategies based on the physiological needs of riparian plants. To meet these needs on Santa Rosa Island, grazing management must be changed from the existing year-long continuous grazing system to a system that manages the timing, season of use, and or intensity of grazing in riparian areas.

Grazing management strategies to improve riparian areas have been researched in recent years, and generally fall into three categories: exclusion by stream corridor fencing or pasture closure, specialized grazing strategies, and riparian pasturing. Platts (1986) provides the following summary of these strategies.

Stream Corridor Fencing and Excluded Pastures

This management strategy is a variant of the riparian pasture. They differ in that stream corridor fencing is usually employed when total livestock exclusion is necessary to obtain sequential multiple year rest for the riparian area. Studies by Platts in Tabor Creek, Nevada; Big Creek, Utah and other streams have found that riparian habitats greatly benefit after being fenced to

eliminate heavy livestock grazing. Corridor fencing and cattle exclusion by the BLM in 1965 on Camp Creek, Oregon was successful in restoring silt-trapping and bank-protecting riparian vegetation within five to six years after the project was initiated. Full channel and floodplain function, resembling its 1875 character, was restored in about 20 years after the installation of the protective fences (Hunter, 1991). Again, however, it may not be economically feasible to fence every streamside corridor, and grazing strategies that regulate animal distribution and forage use without fencing may achieve the desired riparian management goal, albeit at a rate that is slower than when fencing strategies are employed.

Specialized Grazing Strategies

The chief goal of a specialized grazing strategy is to maintain or improve livestock performance while improving or maintaining rangeland conditions by controlling the numbers, type, and distribution of livestock. Generally, two types of specialized grazing strategies are employed to meet these goals; rotational and seasonal grazing systems. A rest rotation system is any grazing strategy that allows a period of rest for a riparian-stream habitat to rejuvenate its potential benefits. Investigations by Platts have revealed no adverse riparian impacts from a well-managed, double-rest-rotation (graze early then rest 2 years, then graze late and rest 2 years) grazing strategy on a study site in Johnson Creek, Idaho. Seasonal grazing follows a strategy of repetitive grazing in the pasture (including riparian areas) during one or two seasons only, then allowing the entire pasture to rest the remaining season. Successful seasonal strategies usually employ grazing in the winter or cooler season, thus leaving the pasture to rest during most of the growing and hot seasons.

Riparian Pasturing

The riparian pasture actually employs some elements of corridor fencing and specialized management strategies to achieve riparian management goals. It is a smaller pasture within the allotment that encompasses the concerned riparian-stream area that will be managed independently to achieve the desired vegetative or habitat responses. The riparian pasture can also include the necessary amount of surrounding uplands to obtain a proper balance of riparian and upland forage. Advantages of the riparian pasture include better control over animal distribution, grazing intensity, and timing as well as increased vegetation production, which in turn allows more management options for its use. One disadvantage to this management scheme is its expense. Platts notes that its use may be worth considering only when valuable natural resources jeopardized by improper riparian grazing management.

Based on a BLM case history on Bear Creek, Oregon, it appears that functionality, and almost full restoration of riparian functions can be obtained with riparian pasturing while allowing grazing

under a structured management system (Hunter 1991). Historically, Bear Creek was dominated by willows and birch trees, with areas of wide wet meadows. After 100 years of predominately continuous year-long cattle grazing, however, the stream was reduce to a "state of total disrepair", with wide and shallow channels, unstable stream banks, deeply incised channel, almost no vegetative cover, and poor water quality resulting from high sediment loads. In 1976, the BLM prescribed a three-pasture late-winter/early spring grazing system preceded by a six-year rest period. The rest period allowed vegetation to recover, silt and sediment were trapped, and floodplains and channels were rebuilt, and the dryland grass communities that dominated the site were replaced by sedges and rushes. In 1982, cattle grazing was reinstated following the riparian three pasture system. After six years of rest, and 10 years of grazing, the Bear Creek-floodplain has aggraded three feet, the channel has narrowed by 30 to 40 feet, and the sedge-rush-grass riparian community has provided bank and channel protection ultimately restoring trout habitat to this stream.

Specific Opportunities on Santa Rosa Island

Several grazing management concepts were identified which might lead to certain areas achieving properly functioning condition. It is clearly understood, however, that riparian areas can (and need to) function properly before they achieve their Potential Plant Community (PPC) or Potential Natural Community (PNC). For example, certain woody species, (e.g. willows) may have to be actively recruited in certain drainages where they are presently absent. Therefore, we do not presume that achieving proper functioning condition is necessarily a desirable management objective for the park - only that properly functioning condition is a necessary first step in eventually achieving some higher vegetation or ecological status.

Since grazing is scheduled to end in 2012 the selection of a riparian management strategy that requires a large initial capital investment in infrastructure must be considered relative to the temporal derivation of benefits for that expenditure. Proper functioning condition on Santa Rosa Island streams can be achieved at a faster rate by using exclusionary management practices such as stream corridor fencing, albeit at a much higher initial cost. On the other hand, employment of targeted special grazing management strategies that will start the riparian areas on an upward trend to Proper Functioning Condition at a slower rate than exclusionary practices, but at only a fraction of the cost. Three alternative grazing concepts, with options, and their estimated implementation costs, are identified using the direct or modified application of the general strategies discussed above. The alternatives are: (1) a targeted seasonal grazing system on riparian areas identified in the State's Cleanup and Abatement Order and concurrently have high potential for natural restoration and timely attainment of proper functioning condition (three options of this alterative are

discussed); (2) exclusion by stream corridor fencing or pasture closures for streams cited in the State's order, and; (3) implementation of an island-wide rotational grazing system.

The alternatives and options presented do not represent the universe of viable grazing management strategies, and other variations that incorporate riparian-area rest are possible. For any of these grazing concepts that would be implemented, a detailed grazing plan would have to be developed which carefully and clearly articulates measurable riparian objectives. Such a plan would necessarily involve close collaboration between the park and the Vail and Vickers ranch.

Exclusion by Stream Corridor Fencing or Pasture Closures

The two options presented with this alternative offer the best opportunity, next to total elimination of grazing altogether, to reestablish vegetation and obtain proper functioning condition in a relatively rapid fashion (as quickly as 5 to 8 years) by constructing fences around stream riparian areas or by closing to grazing selected pastures.

Option A: Under this option, a corridor fence would be constructed around each stream that is cited in the State's Order. We estimate that about 50 miles of fence would be required to fence each stream corridor, including Old Ranch Canyon, Arlington Canyon, Quemada Canyon, Water Canyon, and Tracion Canyon. Riparian areas could still fulfill their historic role in providing water to livestock by constructing two to three water gaps at strategically located access points in each exclosure. At an estimated contracted cost of about $10,000/mile for a barbed-wire fence, the initial capital investment required to implement this option is about $500,000.

Option B: This option would implement total exclusion of livestock grazing by closing, in perpetuity, existing pastures to grazing that contain riparian areas with high potential for restoration of functioning riparian conditions. Based on our assessment, good candidates for closure would be pastures that encompass Old Ranch Canyon (Old Ranch Pasture) and Arlington Canyon (Pocket Field Pasture). Because this option would utilize existing fences to exclude livestock, initial capital expenditures would be eliminated. However, because the closure of the two pastures would remove about 10,800 acres from the available forage base, the permittee would most likely have to take a significant cut in their allowable stocking rate. Implementation of this option would require that historical actual use information be obtained from the permittee.

Targeted Seasonal Grazing

This alternative provides an opportunity to improve riparian vegetation by controlling the time, season of use and intensity of grazing in the pastures with streams that have been cited by the State as having degraded riparian systems and water quality standard violations and that also have high potential to achieve PFC in a timely fashion (7 to 10 years). Based on the team's assessment, Old Ranch and lower reaches of Arlington Canyon are two streams that appear to have characteristics conducive for rather rapid natural restoration of functional riparian conditions. Starting with these pastures will have less economic impact on the ranch and will allow the park and ranch to jointly develop riparian management strategies that could eventually be applied to the rest of the island. Three options of this alternative that could be applied to Old Ranch and Pocket Field Pastures are presented below. Under all three options, resting the pastures for one or two years prior to implementing cool season grazing would allow riparian vegetation recovery at a faster rate.

Option A. Changing continuous grazing to cool season grazing (Approximately November through May) appears to be a viable option. During the assessment team's visit to the island, livestock were widely distributed due to cool weather, green forage, and abundant water. Grazing in Old Ranch and Arlington from about Nov 1 to May 1 would allow riparian areas relief from grazing impacts during the hot season when upland forage is dry and water is limited.

To implement this approach it will be necessary for the ranch to supply the park with accurate historical actual use information in Old Ranch and Pocket Field Pastures. Information concerning the number of head and time used in both pastures should be converted to AUMs, and the AUMs that would normally be used during the hot season could be distributed over the rest of the island. However, if the remainder of the island is fully stocked at the present, increased stocking rates over the rest of the island during the dormant season could adversely affect upland vegetation, watershed function and cattle performance.

If no actual use data are available the forage data from the range management plan or Natural Resource Conservation Service range site technical guides could be used to establish an initial stocking level. Suitability criteria for slope and distance to water must be applied for this data to be meaningful. If digital elevation models are available for the island suitability maps can be completed using GIS. In all likelihood, a similar stocking rate analysis will have to be conducted for the island-wide grazing EIS.

The dates when cattle are turned in and taken out of the pastures should be based on growing conditions, utilization

levels other resource considerations such as the plover nesting season rather than rigid calendar dates. For example, if the weather remains cool well into May it may be possible to leave cattle in the pastures longer than scheduled if the key riparian areas are not showing signs of over utilization. Conversely, if forage greens up later than usual in the fall, turnout may have to be delayed. In any case it is important that both the NPS and the ranch understand the criteria that determines when the cattle will be moved.

Option B. A second option is to figure actual use in Wire Field and Old Ranch pasture and confine cattle to Old Ranch in the rainy season and Wire Field in the dry season. A water development would be required in wire field. This approach would increase stock density in both pastures while maintaining existing stocking rates. Increased stock density could be an issue if cattle are in Old Ranch during the plover nesting season.

Option C. A third option is to determine the average actual use during the hot season in Old Ranch and Pocket Field and simply reducing the total actual use on the island by that amount. This would result in no change in stocking rate or stocking density on the remainder of the island. Cool season grazing could then be implemented as described in Alternative A.

The cost of implementing any of the options for this alternative are would be increased labor costs to move the livestock above and beyond what the permittee now expends.

Island-Wide Rotational Grazing

Island-wide rotational grazing offers the best opportunity for comprehensively managing all of the island's riparian systems and their associated upland watersheds on a long-term basis. This grazing strategy is similar to a short duration/high intensity grazing or timed grazing system and it uses either herding or fencing to control the distribution of grazing cattle throughout the island. Each area or subpasture will be grazed by cattle until fully utilized, then the cattle will be moved to another area or sub-pasture. The amount of time spent in each area or sub-pasture will be a function of the amount of forage available to cattle. Using this strategy will improve the distribution of cattle, increase the uniformity of forage utilization, and allow for long periods of rest for much of the island, especially the riparian areas.

This strategy will create two sets of pastures. The first set comprises the smaller pastures of Old Ranch, Wire Field and Lobo. Carrington will become a holding pasture. This set will have one herd rotated between the three pastures. The second set consists

of Pocket Field, North and South pastures. This set will have two herds during the growing season, and one herd during the dry season rotated between the three large pastures.

There are two sub-options for this grazing strategy. One uses additional fencing to create six sub-pastures each in North and South pastures. The other relies on herding cattle from one area to the next. Both options share the concept of another herd of cattle being rotated through the set of smaller pastures. Both options would fulfil the watering needs of the cattle by incorporating existing water sources (springs and streams) within each pasture. Both options will require a high degree of cooperation between the park and ranch so that both parties clearly understand the criteria that determines when cattle will be moved.

Option A. This option divides North and South pastures into twelve sub-pastures (six each in North and South). Pocket field will remain undivided. Cattle will be rotated through the set of subpastures throughout the year. Rotations will be more frequent during the growing season, slower during the dry season. This option will allow for significant periods of rest for all drainages on the island, but will not control distribution of animals as well as Option B.

A substantial amount of fencing (about 25 miles) will be required to create the new sub-pastures. Fencelines will be designed along watershed boundaries or along existing roads. In addition, some herding of animals within the sub-pastures will be required, particularly during the dry season. The amount of herding will be substantially less than needed in Option B.

Option B. This option relies on herding animals to control distribution of cattle on the island. No new fencing will be required. However, the permittee will, in all likelihood, need to hire an additional four to eight personnel to herd the animals. Timing of movement of the herds will depend on resource condition. Rotations will be more frequent during the growing season than the dry season. Active herding will allow for greater control of distribution of cattle, extensive periods of rest for much of the island, and greater protection of riparian areas when a watershed is being grazed by the herd.

Although requiring less capital investment, the extra herders will lead to additional personnel costs for the permittee. These costs will depend upon the wages and befits paid to the herders. Additional horses may also be required.

The primary drawbacks are high levels of initial capital costs required for fencing (about $250,000 for option A) and/or the need

for sustained intensive management by the permittee. The time required for recovery of riparian function may be slower (15 to 20 years) than for systems involving intensive riparian management or exclosures. Also, it may be more difficult to control riparian forage utilization than in systems which more directly target riparian areas.

SUMMARY AND CONCLUSIONS

The large arroyo systems on Santa Rosa Island have undergone a long and complex evolution. The arroyos generally are stable, vertically, and are in fairly advanced stages of widening. The main factor retarding continued arroyo evolution and healing, including sediment aggradation, development of effective floodplains and narrowing of inner channels, is the absence of woody and herbaceous riparian vegetation.

Most Santa Rosa Island riparian areas that are associated with low to moderate stream gradients have a very good chance of responding to changes in grazing management that allows for multi-year, or at least seasonal, rest of the riparian areas. Three alternative grazing strategies, that incorporate these tenets have been developed that include exclusion by stream corridor fencing or pasture closure, targeted seasonal grazing, and island-wide rotational grazing.

Short of total elimination of grazing, exclusion of grazing by riparian corridor fencing or closure of existing pastures would allow for the most direct and rapid recovery of riparian function. Riparian corridors could be managed for total exclusion or for direct and intensive management of forage utilization. The primary drawbacks to riparian corridor fencing are initial fence construction costs and the need for intensive management by the permittee should it be desired to graze riparian corridors. The initial fencing costs could be eliminated by utilizing existing pastures fences for exclusion. However, stocking rates would most likely have to be reduced for other pastures on the island.

Island-wide rotational grazing offers the best opportunity for comprehensively managing all of the island's riparian systems and their associated upland watersheds on a long-term basis. The primary drawbacks are high levels of initial capital costs required for fencing and water development and the need for sustained intensive management by the permittee. The time required for recovery of riparian function may be slower than for systems involving intensive riparian management or exclosures. Also, it may be more difficult to control riparian forage utilization than in systems which more directly target riparian pastures.

Targeted seasonal grazing offers the best opportunity to enhance riparian function in selected reaches, with minimum up-front investment and minimum long-term impact on current grazing

management. This would be particularly true if initial efforts were focused on potentially responsive riparian systems in the Island's smaller pastures. The primary drawbacks are the lack of island-wide management and the slower recovery time compared to systems involving intensive riparian management or exclosure.

Implementation of any of the alternative grazing management concepts should be preceded by careful development of measurable riparian condition objectives. This should be done in close coordination with the permittee. The effectiveness with which management is achieving objectives needs to be intensively monitored, and there needs to be a commitment up-front on the part of the NPS and permittee to make any necessary adjustments in management based upon mutual reviews of monitoring information. Finally, any grazing strategy designed to achieve riparian objectives must also consider the associated uplands. It is essential that adequate residue remain on the uplands for the watershed as a whole to function properly.

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APPENDIX A

Cleanup or Abatement Order for Santa Rosa Island
Channel Islands National Park
Order No. 95-064

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION
81 Higuera Street, Suite 200
San Luis Obispo, CA 93401-5427

CLEANUP OR ABATEMENT ORDER NO. 95-064

Concerning

United States Department of the Interior
National Park Service
Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001

The California Regional Water Quality Control Board, Central Coast Region (hereafter Board), finds:

1. The National Park Service, Channel Islands National Park (hereafter discharger) has discharged bacteria and sediment into waters of the State which is a violation of prohibitions contained in the Regional Water Quality Control Plan for the Central Coast Basin (hereafter Basin Plan) and creates, or threatens to create, conditions of pollution or nuisance.

2. The discharger owns Santa Rosa Island and has jurisdiction over rangeland and road activities on Santa Rosa Island, Santa Barbara County. Santa Rosa Island is listed in the Regional Water Quality Control Plan for the Central Coast Basin (hereafter Basin Plan) under the Santa Barbara Channel Hydrologic Unit (316.00).

3. Waterbodies on the island that are not specifically listed in the Basin Plan have, at a minimum, the following beneficial uses: municipal and domestic water supply, body contact and non-contact water recreation, and warm fresh water habitat.

4. Waterbodies on the island that are listed in the Basin Plan have the beneficial uses designated in Resolution 94-06. The beneficial uses include:

   Municipal and domestic water supply
   Agricultural supply
   Body contact and non-contact water recreation
   Wildlife habitat
   Warm freshwater habitat
   Biological habitats of special significance
   Rare, threatened, or endangered species
   Commercial and sport fishing
   Estuarine habitat
   Freshwater replenishment

5. The discharger is responsible for activities on Santa Rosa Island including rangeland and road management. The discharger permits the Vail and Vickers Santa Rosa Island Cattle Ranch, Santa Barbara County to operate on the island under a Special Use Permit (most recently issued in 1993). The discharger develops a Special Use Permit that contains the rangeland management plan which governs cattle operations, location of roads, and other management measures to protect the beneficial uses of Santa Rosa Island.

6. The discharger permits cattle to graze freely in and around riparian areas. Cattle in riparian areas physically trample riparian vegetation and stream banks. This damages riparian habitat and causes erosion, which pollutes surface water. Cattle also emit fecal matter and urine which pollutes surface water directly and indirectly via run-off.

7. Discharges of soil, fecal matter, and urine have caused or threaten to cause conditions of pollution in Canada Lobos, Quemada Canyon, Water Canyon, and other surface waters on Santa Rosa Island.

8. Water quality analysis by the discharger indicates:

   a. Elevated bacteria levels in Quemada Canyon and Water Canyon creeks have unreasonably affected the quality of waters for the contact recreation beneficial use.

   b. Elevated pH levels in Quemada Canyon and Water Canyon creeks have unreasonably affected the quality of waters for the contact recreation and warm water habitat beneficial uses.

9. The Basin Plan prohibits discharges into waters of the State that impact beneficial uses.

10. This enforcement action is taken for the protection of the environment and as such is exempt from the provisions of the California Environmental Quality Act (Public Resources Code, Section 21100 et seq.) in accordance with Section 15321, Chapter 3, Title 14, California Code of Regulations.

THEREFORE, IT IS HEREBY ORDERED, pursuant to Sections 13267 and 13304 of the California Water Code, The National Park Service, Channel Islands National Park, its agents or assigns, shall:

A. **Forthwith** abate rangeland and road management practices which degrade riparian habitat, degrade water quality, and induce sediment transport into surface waters of Santa Rosa Island.

B. Submit a complete report to the Regional Board Executive Officer, by **July 1, 1995**, containing temporary plans and measures to clean up and restore areas impacted by current rangeland and road management practices. The plans shall contain a timeline for completion of implementation actions detailed in the plans.

C. Begin implementation of field actions described in the temporary plans by **July 14, 1995.**

D. Submit a complete report to the Executive Officer, by **September 5, 1995.** The report shall contain final implementation plans and document compliance with conditions of this Order.

E. Monitoring and reporting shall be conducted as described in the attached Monitoring and Reporting Program No. 95-064.

If, in the opinion of the Executive Officer, the discharger fails to comply with the provisions of the Order, including compliance with the above mentioned schedule, the Executive Officer is authorized to request the Attorney General to take appropriate enforcement action against the Discharger, including injunction and civil remedies, if appropriate; issue an Administrative Civil Liability Complaint; or refer the discharger back to the Board for further enforcement action.

Paul Jagger 5/18/95

for **ROGER W. BRIGGS, Executive Officer**

hek/strosa3.CAO

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM NO. 95-064
FOR
CHANNEL ISLANDS NATIONAL PARK, NATIONAL PARK SERVICE

RECEIVING WATER MONITORING

Receiving water stations for Canada Lobos Creek (L), Quemada Canyon Creek (Q), Water Canyon Creek (W), Arlington Canyon Creek (AR), Tracion Canyon Creek (TC), Clapp Springs (C), and Old Ranch Canyon Creek estuary (OR) shall be established as follows:

Station No.	Location
L2	100 meters above the Smith Highway.
L3	25 meters below the oak grove below the Smith Highway.
L4	At the lower end of the cattle exclosure.
W2	Just below Army Camp.
W3	At the corral in lower water canyon.
W4	Just below the camp ground.
Q2	Next to Las Cruces corral.
Q3	Next to corral in Old Ranch Canyon.
Q4	0.8 kilometers from the creek mouth.
AR1	400 meters above the Smith Highway.
AR2	100 meters below the Smith Highway.
AR3	0.8 kilometers from the creek mouth.
TC1	4.5 kilometers from the creek mouth.
TC2	2.4 kilometers from the creek mouth.
TC3	0.8 kilometers from the creek mouth.
C	Where water enters spring catchment area.
OR1	Mouth of estuary.
OR2	Where creek enters estuary.

M & R Program No. 95-064 2

Representative samples of the receiving water shall be collected and analyzed for the following:

Parameter	Station No.	Units	Minimum Sampling and Analyzing Frequency
Flow	All Stations	CFS	Monthly
Turbidity	All Stations	NTU	"
Total Dissolved Solids	All Stations	mg/l	"
*Dissolved Oxygen	All Stations	mg/l	Monthly (November through May), Twice a month June through October.
pH	All Stations	mg/l	"
**Temperature	All Stations	mg/l	Monthly (November through May), Twice a month June through October.
Conductivity	All Stations	mg/l	"
Ammonia (total)	L3,W3,Q3,AR2, TC2,OR2,C	mg/l	"
Nitrate Nitrogen	L3,W3,Q3,AR2, TC2,OR2,C	mg/l	"
Total Kjeldahl Nitrogen	L3,W3,Q3,AR2, TC2,OR2,C	mg/l	"
Total Phosphorus	L3,W3,Q3,AR2, TC2,OR2,C	mg/l	"
Dissolved Orthophosphate	L3,W3,Q3,AR2, TC2,OR2,C	mg/l	"
***Total Coliform Organisms	L3,W3,Q3,AR2, TC2,OR2,C	MPN/100ml	"
***Fecal Coliform Organisms	L3,W3,Q3,AR2, TC2,OR2,C	MPN/100ml	"
****Vegetation Transects	L2,L3,W2,W3,Q2, Q3,AR1,AR2,TC1, TC2,OR2,C		Twice per year (April and October)
*****Photo Documentation	All Stations		Twice per year (April and October)

*All stations shall be monitored using grab samples. Samples shall be collected when dissolved oxygen concentrations are presumed to be at their lowest levels (pre-sunrise). In addition dissolved oxygen shall be measured every three hours over a 24 hour period once a month at stations L3,Q3,AR2,TC2, and OR2. In leu of taking

samples every three hours over a 24 hour period, dissolved oxygen may be measured and charted using continuous read meter.

**All stations shall be monitored using grab samples. In addition temperature shall be measured every three hours over a 24 hour period once a month at stations L3,Q3,AR2,TC2, and OR2. In leu of taking samples every three hours over a 24 hour period, dissolved oxygen and temperature may be measured and charted using continuous read meter.

***Total and fecal coliform organisms shall be collected using grab samples.

****Vegetation transect monitoring shall be conducted to sample actual vegetation and document field changes over time. Vegetation transects (e.g. step-point transect method or residual dry matter) consist of a starting point, bearing or direction, observations and plots, and transect documentation. The starting point must be located and referenced by a permanent marker. A bearing should cross drainages in order to obtain a representative sample of the area. Observations and plots consist of a sampling interval, observation sites, plot size, number of observations or plots, and marking locations. All transect documentation should exercise full disclosure and provide data which would enable comparison with future study data of the chosen area.

*****Aerial and photographic coverage shall also be conducted for significant events (storms, fires, etc...). Aerial photo scale shall reflect the size of the watershed, with a minimum level of detail of 1:1,000 scale. Photographs shall be site specific, close-up color and false color infrared (IR) will be used to show vegetation cover changes and erosion in the watersheds. Photos shall document current conditions, implementation of management measures, and success of the management measures.

REPORTING

Results of the monitoring conducted each month shall be reported to the Board beginning August 20, 1995. Monitoring reports shall be due on the 20th of each month thereafter.

By January 30th of each year, the discharger shall submit an annual report to the State Board, Regional Board, and EPA describing the discharger's implementation of management measures and monitoring conducted over the previous twelve months. In the event that the discharger is not in compliance with any condition or requirement of this order, then the discharger shall also include reasons for noncompliance and state how and when the discharger shall comply with such conditions and requirements. This report shall contain, but not be limited to, the following information:

1. A summary of all data collected and analytical results in tabular and graphical form. Sampling and analysis shall be performed in accordance with the techniques described in 40 CFR Part 136 and amendments thereto.

2. A summary of all management measures implemented.

3. A summary of conditions and requirements contained in the Special Use Permit that permits the cattle operations, location of roads, and other management cattle operation measures on Santa Rosa Island.

Reports shall be signed by a principal executive officer, ranking elected official, or other duly authorized employee if such employee is responsible for overall operation of Santa Rosa Island National Park. Signed copies of these shall be submitted to the Regional Administrator and the State at the following addresses:

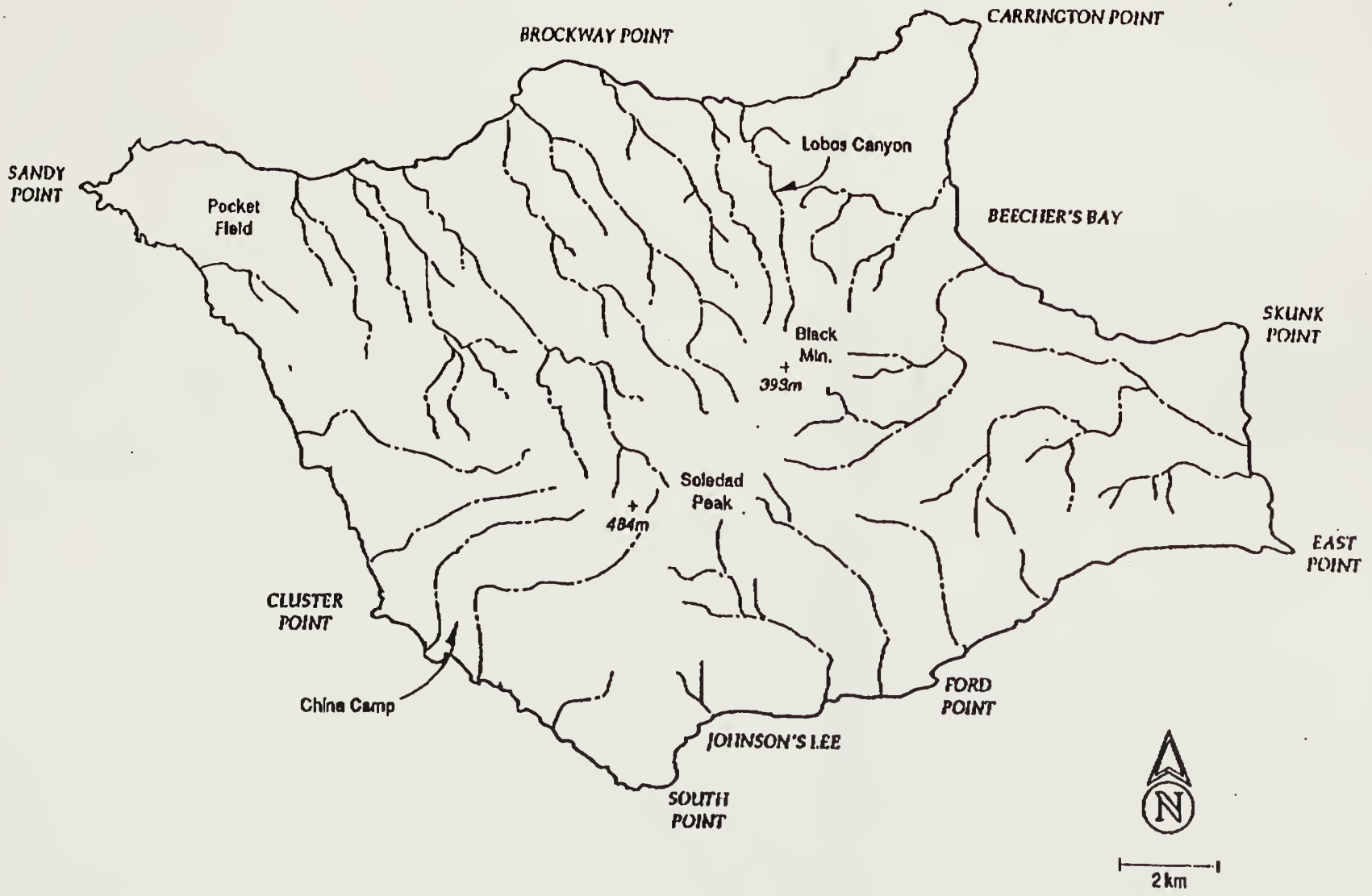
Regional Administrator
U.S. Environmental Protection Agency, Region 9, Attn: W-5
75 Hawthorne Street
San Francisco, CA 94105

California Regional Water Quality Control Board
Central Coast Region
81 Higuera Street, Suite 200
San Luis Obispo, CA 93401

State Water Resources Control Board
Division of Water Quality
Nonpoint Point Source Unit
P.O. Box 944213
Sacramento, CA 94244-2130

ORDERED BY Paul Jorgensen
for Executive Officer
5/18/95
Date

hek:95-064.mrp


BROCKWAY POINT
CARRINGTON POINT
Lobos Canyon
SANDY POINT
Pocket Field
BEECHER'S BAY
SKUNK POINT
Black Mtn.
+ 393m
Soledad Peak
+ 484m
EAST POINT
CLUSTER POINT
China Camp
FORD POINT
JOHNSON'S LEE
SOUTH POINT
N
2 km

APPENDIX B

Field Sheets
Process for Determining Proper Functioning Condition

Standard Checklist

Name of Riparian-Wetland Area: Windmill Canyon #1 Upper Horse Pasture

Date: 3/21/95 **Segment/Reach ID:** Fence to Bedrock Control

Miles: 3/10 **Acres:**

ID Team Observers: Cece, Bill, Joel, Gary, Jeff, Jim, Don

	Yes	No	N/A	HYDROLOGIC
	X			Floodplain inundated in "relatively frequent" events (1-3 years)
			X	Active/stable beaver dams
1)		X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
2)		X		Riparian zone is widening
3)		X		Upland watershed not contributing to riparian degradation

	Yes	No	N/A	VEGETATIVE
	X			Diverse age structure of vegetation
		X		Diverse composition of vegetation
4)	X			Species present indicate maintenance of riparian soil moisture characteristics
	X			Steambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
5)	X			Riparian plants exhibit high vigor
		X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
			X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
	X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
6)	X			Point bars are revegetating
	X			Lateral stream movement is associated with natural sinuosity
	X			System is vertically stable
7)		X		Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

1) The W/D Component was out of balance and we would expect significant narrow of stream

2) With recent events there has been a widening of active channel which resulted in a loss of riparian vegetation

3) Condition of uplands and recent events have degraded the riparian area thru deposition

4) Woody component indicates some soil moisture but the herbaceous, wetland component is lacking

5) Way too much bare ground to lend any stability

6) Point bars give some appearance to revegetating but still have a fair amount of bare ground

7) Excessive deposition is present

Summary Determination

Functional Rating:

Proper Functioning Condition	____	
Functional--At Risk	X	and at high risk
Nonfunctional	____	
Unknown	____	

Trend for Functional--At Risk:

Upward	____
Downward	____
Not Apparent	X

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	____
No	____

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstreamchannelconditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

* Potential of Windmill Canyon above horse pasture to confluence Cherry Canyon would be the same, but this reach at present would be rated as non-functional

Standard Checklist

Name of Riparian-Wetland Area: Canada Lobos

Date: 3/21/95 **Segment/Reach ID:** #2 Lobo QW Station 3

Miles: _____ **Acres:** _____

ID Team Observers: Cece, Bill, Joel, Gary, Jeff, Jim, Don

	Yes	No	N/A	HYDROLOGIC
	X			Floodplain inundated in "relatively frequent" events (1-3 years)
			X	Active/stable beaver dams
1)		X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	X			Riparian zone is widening
2)		X		Upland watershed not contributing to riparian degradation

Yes	No	N/A	VEGETATIVE
X			Diverse age structure of vegetation
X			Diverse composition of vegetation
X			Species present indicate maintenance of riparian soil moisture characteristics
X			Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
X			Riparian plants exhibit high vigor
X			Adequate vegetative cover present to protect banks and dissipate energy during high flows
		X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
	X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
	X			Point bars are revegetating
	X			Lateral stream movement is associated with natural sinuosity
	X			System is vertically stable
3)		X		Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

1) W/D ratio appeared to be out of balance due to recent flood event but not significantly

2) Even though the reach was rated PFC there is a high amount of deposition occuring from recent event but at this time is being handled by the system and aggrading

3) There is deposition occuring but for the most part is being handled by the system

Summary Determination

Functional Rating:

Proper Functioning Condition	X
Functional--At Risk	
Nonfunctional	
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Canada Lobos

Date: 3/21 **Segment/Reach ID:** #3 Lobo-Willows

Miles: _____ **Acres:** _____

ID Team Observers: Cece, Bill, Gary, Joel, Jeff, Jim

Yes	No	N/A	HYDROLOGIC
X			Floodplain inundated in "relatively frequent" events (1-3 years)
		X	Active/stable beaver dams
X			Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
X			Riparian zone is widening
	X		Upland watershed not contributing to riparian degradation

1)

Yes	No	N/A	VEGETATIVE
X			Diverse age structure of vegetation
X			Diverse composition of vegetation
X			Species present indicate maintenance of riparian soil moisture characteristics
X			Steambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high streamflow events
X			Riparian plants exhibit high vigor
X			Adequate vegetative cover present to protect banks and dissipate energy during high flows
		X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

Herb

Yes	No	N/A	EROSION DEPOSITION
X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
X			Point bars are revegetating
X			Lateral stream movement is associated with natural sinuosity
X			System is vertically stable
X			Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

1) PFC -- There is willow regeneration

-- it appears willow component will increase

-- no cottonwood regeneration noted

Summary Determination

Functional Rating:

Proper Functioning Condition	X
Functional--At Risk	
Nonfunctional	
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Arlington Canyon
#4 Arlington Corrals upstream

Date: 3/22/95 **Segment/Reach ID:** S. Fork to mainstem

Miles: 1 mile **Acres:**

ID Team Observers: Jeff, Katherine, Kate, Gary, Don

	Yes	No	N/A	HYDROLOGIC
	X			Floodplain inundated in "relatively frequent" events (1-3 years)
			X	Active/stable beaver dams
1)		X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
2)		X		Riparian zone is widening
3)		X		Upland watershed not contributing to riparian degradation

	Yes	No	N/A	VEGETATIVE
4)		X		Diverse age structure of vegetation
4)		X		Diverse composition of vegetation
4)		X		Species present indicate maintenance of riparian soil moisture characteristics
4)		X		Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
4)		X		Riparian plants exhibit high vigor
4)		X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
			X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
	X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
5)		X		Point bars are revegetating
6)		X		Lateral stream movement is associated with natural sinuosity
7)	X			System is vertically stable
		X		Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

1) W/D ratio is way out of balance

2) Potential exists but the site is basicly bare ground with some upland species

3) Upland erosion is allowing excessive deposition to reach the riparian area

4) No riparian -wetland species were found but the potential does exist

5) No vegetative development on point bars

6) Stream is showing constant lateral movement with most flow events

7) Excessive deposition from uplands is occuring

Summary Determination

Functional Rating:

Proper Functioning Condition	
Functional--At Risk	
Nonfunctional	X
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Arlington Canyon
#5 Arlington Corral downstream

Date: 3/22/95 **Segment/Reach ID:** for approx 7/10 of a mile

Miles: 7/10 **Acres:**

ID Team Observers: Jeff, Katherine, Kate, Gary, Don

	Yes	No	N/A	HYDROLOGIC
	X			Floodplain inundated in "relatively frequent" events (1-3 years)
			X	Active/stable beaver dams
1)		X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
2)		X		Riparian zone is widening
3)		X		Upland watershed not contributing to riparian degradation

	Yes	No	N/A	VEGETATIVE
4)		X		Diverse age structure of vegetation
4)		X		Diverse composition of vegetation
4)		X		Species present indicate maintenance of riparian soil moisture characteristics
4)		X		Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
4)		X		Riparian plants exhibit high vigor
4)		X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
			X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
	X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
5)		X		Point bars are revegetating
6)		X		Lateral stream movement is associated with natural sinuosity
7)	X			System is vertically stable
		X		Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

1) W/D ratio is totally out of balance

2) Site is basically bare ground

3) Excessive upland erosion

4) No riparian-wetland vegetation present

5) Points bars are bare ground

6) Excessive lateral movement present

7) Excessive erosion from lateral movement and excessive deposition from uplands

Summary Determination

Functional Rating:

Proper Functioning Condition	
Functional--At Risk	
Nonfunctional	X
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Arlington Canyon #6 Ocean--upstream for approximately 1 mile

Date: 3/22/95 **Segment/Reach ID:** approximately 1 mile

Miles: 1 mile **Acres:**

ID Team Observers: Jeff, Katherine, Kate, Gary, Don

	Yes	No	N/A	HYDROLOGIC
	X			Floodplain inundated in "relatively frequent" events (1-3 years)
			X	Active/stable beaver dams
1)		X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
2)		X		Riparian zone is widening
3)		X		Upland watershed not contributing to riparian degradation

	Yes	No	N/A	VEGETATIVE
4)		X		Diverse age structure of vegetation
4)		X		Diverse composition of vegetation
4)		X		Species present indicate maintenance of riparian soil moisture characteristics
4)		X		Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
4)		X		Riparian plants exhibit high vigor
4)		X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
			X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
5)		X		Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
6)		X		Point bars are revegetating
7)		X		Lateral stream movement is associated with natural sinuosity
	X			System is vertically stable
8)		X		Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

1) W/D ratio out of balance

2) Potential exist but site is basically bare ground

3) Excessive erosion from uplands

4) Potential for riparian-wetland vegetation to exist is there but is totally lacking

5) Need some more lateral adjustment to redefine a new floodplain

6) Points bars are bare soil

7) Excessive lateral movement with flow events

8) Excessive erosion and deposition present

Summary Determination

Functional Rating:

Proper Functioning Condition	
Functional--At Risk	
Nonfunctional	X
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Acapulco Canyon #7 Ocean to upstream

Date: 3/22/95 **Segment/Reach ID:** for approx. 1 1/2 miles

Miles: 1 1/2 **Acres:**

ID Team Observers: Gary, John, Katherine, Jeff, Don

	Yes	No	N/A	HYDROLOGIC
	X			Floodplain inundated in "relatively frequent" events (1-3 years)
			X	Active/stable beaver dams
	X			Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
1)		X		Riparian zone is widening
	X			Upland watershed not contributing to riparian degradation

	Yes	No	N/A	VEGETATIVE
2)		X		Diverse age structure of vegetation
2)		X		Diverse composition of vegetation
2)		X		Species present indicate maintenance of riparian soil moisture characteristics
2)		X		Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
2)		X		Riparian plants exhibit high vigor
2)		X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
			X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
	X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
3)		X		Point bars are revegetating
	X			Lateral stream movement is associated with natural sinuosity
	X			System is vertically stable
	X			Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

1) Lacked any riparian-wetland vegetation but landform dictates overall stability of this system

2) Woody species should be in system, were not, but landform dictates stability to a larger extent. Even without vegetation this site showed little evidence of recent flow events.

3) No vegetation present on point bars

Summary Determination

Functional Rating:

Proper Functioning Condition	____	
Functional--At Risk	X	very limited risk
Nonfunctional	____	
Unknown	____	

Trend for Functional--At Risk:

Upward	____
Downward	____
Not Apparent	X

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	____
No	____

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Quemada

Date: 3/22/95 **Segment/Reach ID:** #8 South Pasture Fence

Miles: _____ **Acres:** _____

ID Team Observers: Joel, Bill, Cece, Jim, John Wooley

	Yes	No	N/A	HYDROLOGIC
1)	X			Floodplain inundated in "relatively frequent" events (1-3 years)
			X	Active/stable beaver dams
		X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
		X		Riparian zone is widening
	X			Upland watershed not contributing to riparian degradation

	Yes	No	N/A	VEGETATIVE
		X		Diverse age structure of vegetation
		X		Diverse composition of vegetation
	X			Species present indicate maintenance of riparian soil moisture characteristics
		X		Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
		X		Riparian plants exhibit high vigor
2)		X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
			X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
3)	X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
		X		Point bars are revegetating
4)	X			Lateral stream movement is associated with natural sinuosity
	X			System is vertically stable
	X			Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Reach deeply incised - lack of floodplain. Many spots stream has lateral and vertical geologic controls. Reach lacks vegetation on what few point bars that exist. Width/depth can improve (w/vegetation cover)

1) Not much of a floodplain, W/D can be improved

2) Banks frequently geologically controlled

3) Lots of geologic control

4) Very slow process

Summary Determination

Functional Rating:

Proper Functioning Condition	
Functional--At Risk	
Nonfunctional	X
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	X

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Old Ranch Canyon #9 Old Ranch

Date: 3/22/95 **Segment/Reach ID:** Canyon QW Station 3

Miles: _____ **Acres:** _____

ID Team Observers: Kate, Jim, Joel, Bill, & Cece

Yes	No	N/A	HYDROLOGIC
X			Floodplain inundated in "relatively frequent" events (1-3 years)
		X	Active/stable beaver dams
	X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	X		Riparian zone is widening
	X		Upland watershed not contributing to riparian degradation

Yes	No	N/A	VEGETATIVE
	X		Diverse age structure of vegetation
	X		Diverse composition of vegetation
X			Species present indicate maintenance of riparian soil moisture characteristics
	X		Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
	X		Riparian plants exhibit high vigor
	X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
		X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

Yes	No	N/A	EROSION DEPOSITION
X			Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
	X		Point bars are revegetating
X			Lateral stream movement is associated with natural sinuosity
X			System is vertically stable
X			Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

Reach has high W/D ratio. Could use more deposition. Main problem lies w/ lack of vegetation (in both cover & composition) Many point bars completely lack vegetation. Lack of strong sod forming herbaceous species (like Juncus mexicanus) but see lots of Distichlis spicata. See no riparian woody species.

1) W/D needs a little more trailing head cuts, poor cover

2) Lacking shrubs and herbaceous (i.e. Jume)

3) Some but inadequate

4) More depostion would be desirable

Summary Determination

Functional Rating:

Proper Functioning Condition	
Functional--At Risk	
Nonfunctional	X
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	X

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____

Standard Checklist

Name of Riparian-Wetland Area: Jolla Vieja

Date: 3/22/95 **Segment/Reach ID:** #10

Miles: _____ **Acres:** _____

ID Team Observers: Kate, Bill, Jim, Joel, Cece

	Yes	No	N/A	HYDROLOGIC
1)		X		Floodplain inundated in "relatively frequent" events (1-3 years)
2)			X	Active/stable beaver dams
3)		X		Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
		X		Riparian zone is widening
		X		Upland watershed not contributing to riparian degradation

	Yes	No	N/A	VEGETATIVE
		X		Diverse age structure of vegetation
		X		Diverse composition of vegetation
4)	X			Species present indicate maintenance of riparian soil moisture characteristics
		X		Steambank vegetation is comprised of those plans or plant communities that have root masses capable of withstanding high streamflow events
		X		Riparian plants exhibit high vigor
		X		Adequate vegetative cover present to protect banks and dissipate energy during high flows
			X	Plant communities in the riparian area are an adequate source of coarse and/or large woody debris

	Yes	No	N/A	EROSION DEPOSITION
5)		X		Floodplain and channel characteristics (i.e., rocks, coarse and/or large woody debris) adequate to dissipate energy
		X		Point bars are revegetating
6)	X			Lateral stream movement is associated with natural sinuosity
7)	X			System is vertically stable
		X		Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

Remarks

The floodplain is essentially inaccesible to stream waters. There is little floodplain development despite excessive lateral erosion. The arroyo is widening overall, but, because the floodplain is so inaccessible the riparian zone is not. The ripanan corridor is extremely narrow. Upland areas appear to be utilized heavely, relative to area closer to stream (why?). This leads to inc. run off during storm events leading to further degradation. Some areas have adequate roughness to dissipate energy, but this is more of the exception than the rule.

1) Floodplain is too high up

2) Inaccessibility of floodplain

3) Arroyo is widening but, riparian zone is not, run off due to take of upland veg

4) Very narrow riparian zone

5) Occasionally yes

6) Some areas not

7) Excessive Lateral erosion

Summary Determination

Functional Rating:

Proper Functioning Condition	
Functional--At Risk	
Nonfunctional	X
Unknown	

Trend for Functional--At Risk:

Upward	
Downward	
Not Apparent	

Are factors contributing to unacceptable conditions outside BLM's control or management?

Yes	
No	X

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstreamchannelconditions

___ Channelization ___ Road encroachment ___ Oil field water discharge

___ Augmented flows ___ Other (specify) _____